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(71) Applicant(s)  
Eric Collier  
25 King Edwards Road, ASCOT, Berks, SL5 8NY,  
United Kingdom

(72) Inventor(s)  
Eric Collier

(74) Agent and/or Address for Service  
Eric Collier  
25 King Edwards Road, ASCOT, Berks, SL5 8NY,  
United Kingdom

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G01S 13/93, G08G 1/16

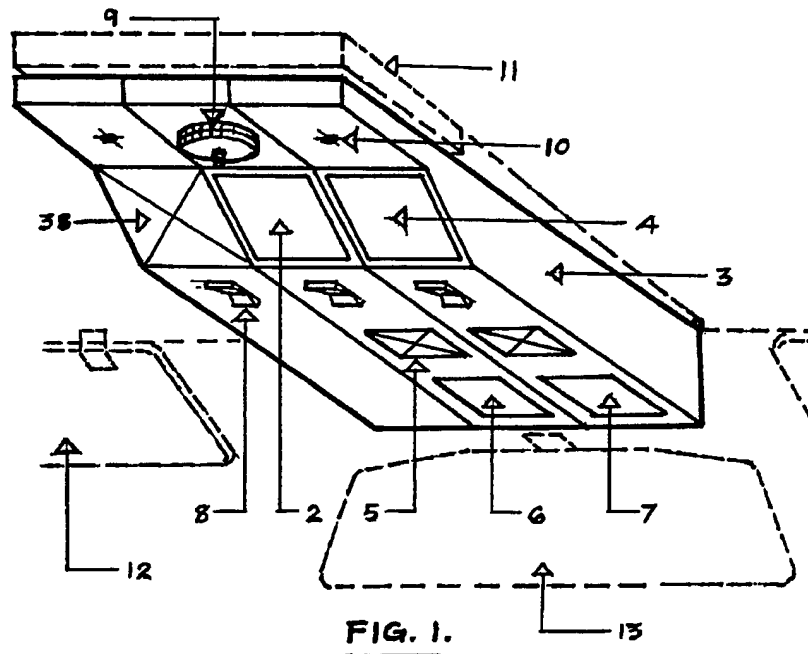
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U1S S1820

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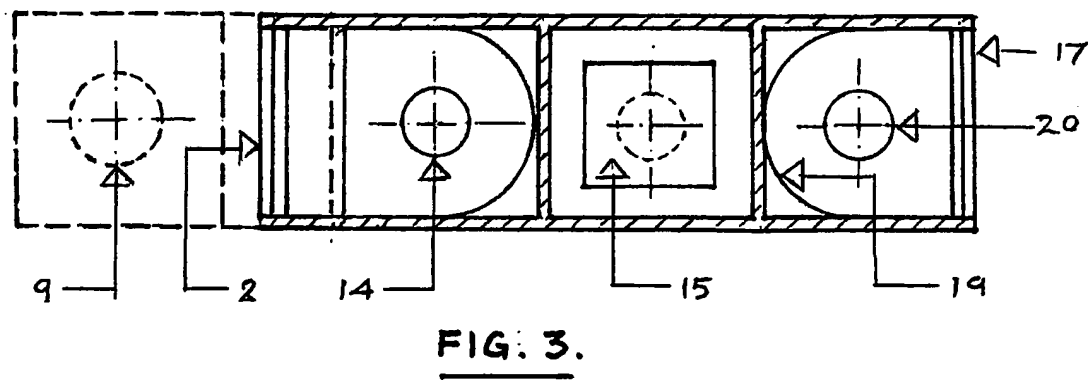
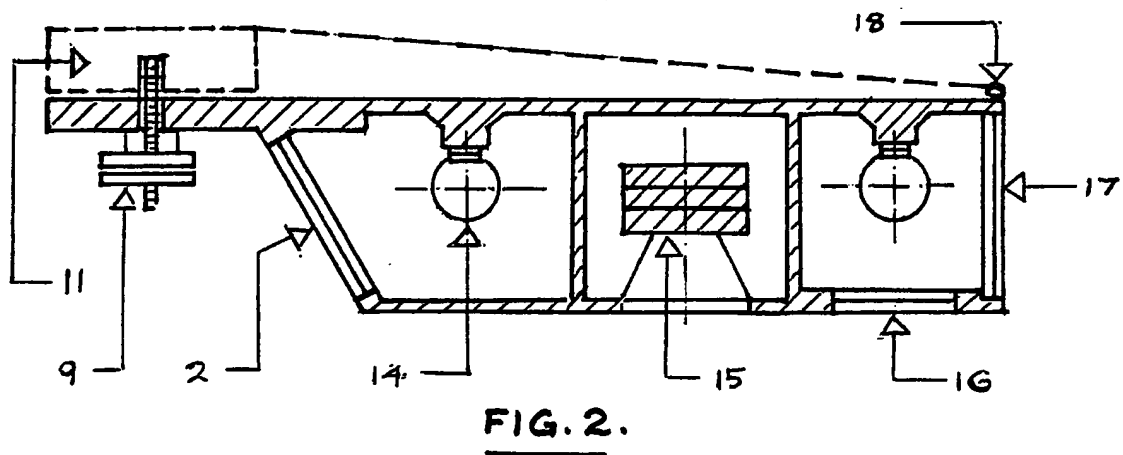
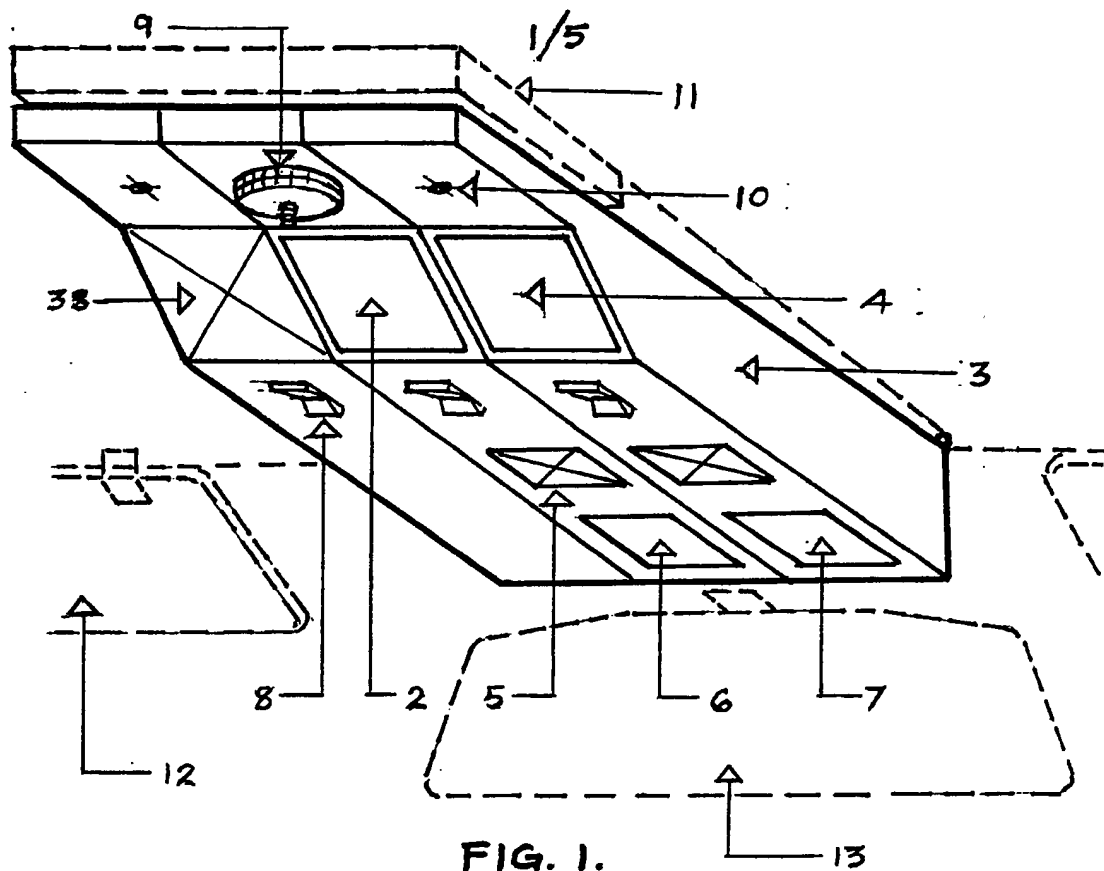
(58) Field of Search  
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INT CL<sup>5</sup> B60Q 1/44 1/52 9/00, G01S 13/93, G08G  
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## (54) Distance alarm device

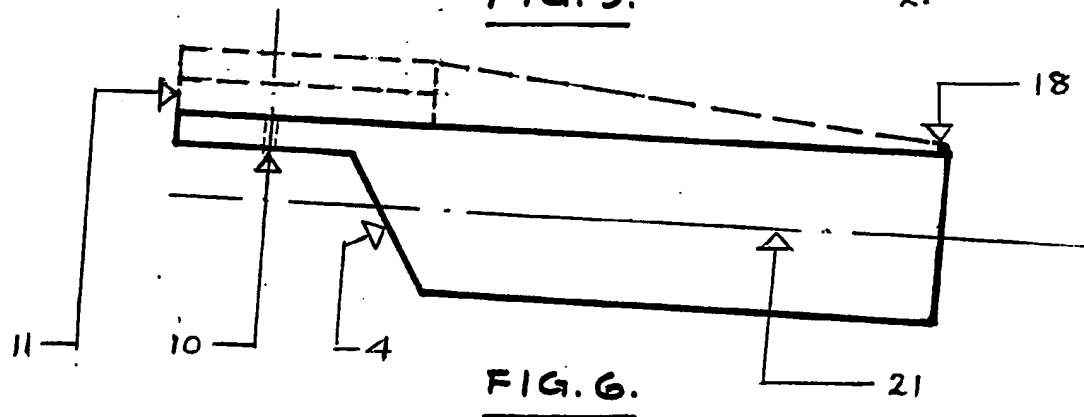
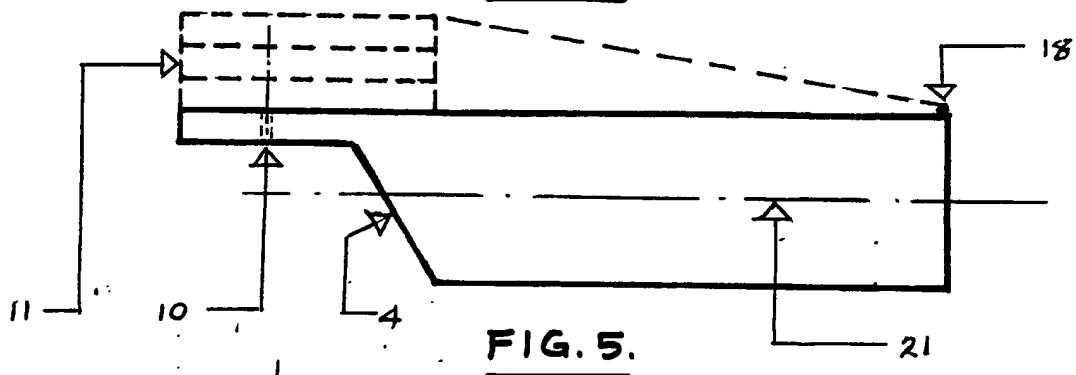
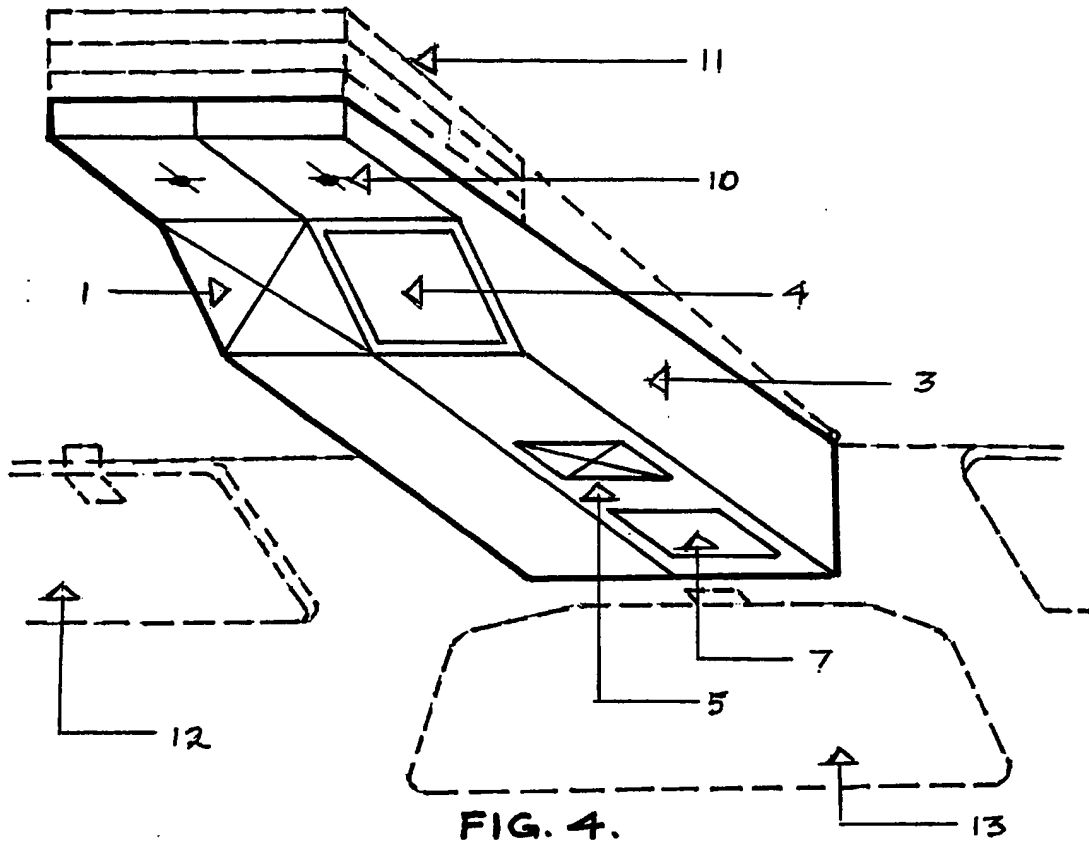
(57) An alarm device or devices, which when fitted to a travelling vehicle may warn the driver, by visual and audible alarm signals, of the distance of other vehicles located in front, and at the rear of the said vehicle. The device may be fitted at the front, also the rear of the vehicle, to provide visual signals to all three drivers. It may incorporate single range, or combined range sensors set to predetermined distances, or zones, which may activate visual, and audible, alarm signals. These sensors may contain manual over-ride switched to allow them to be switched on, or off, to suit various driving conditions. The warning lights may be in different colours to identify the various distance zones. The audible alarm may be by buzzer, bell or bleeper, or alternatively, a pre-recorded audio tape, as an effective supplementary warning.



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2/5



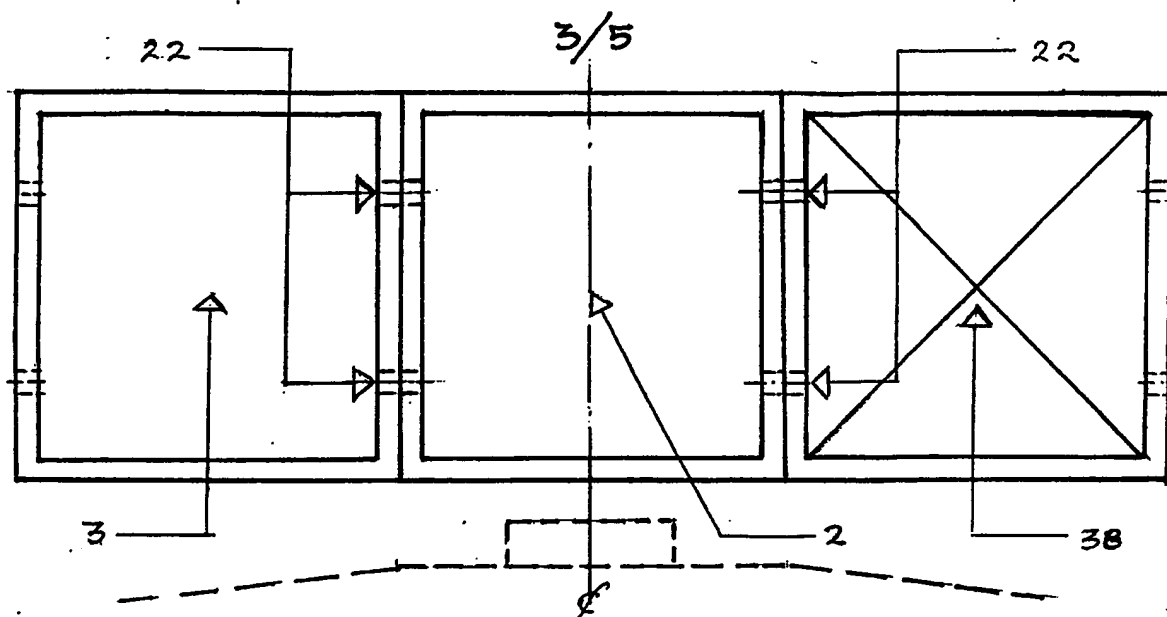


FIG. 7.

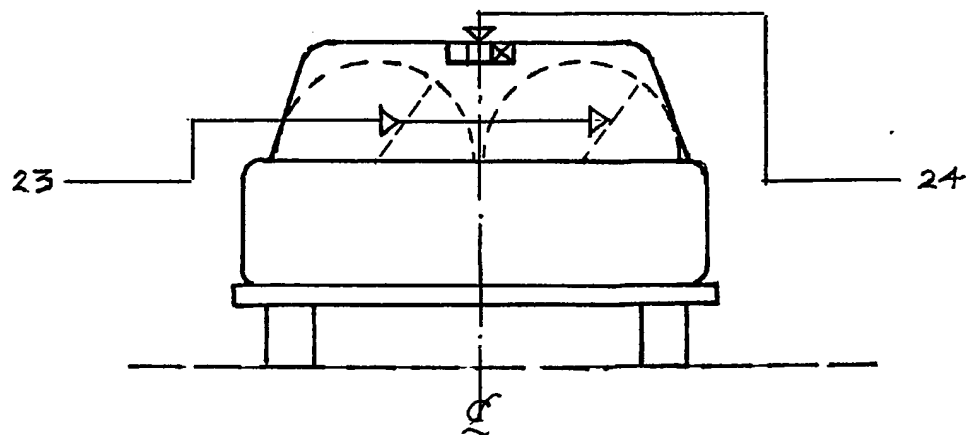


FIG. 8.

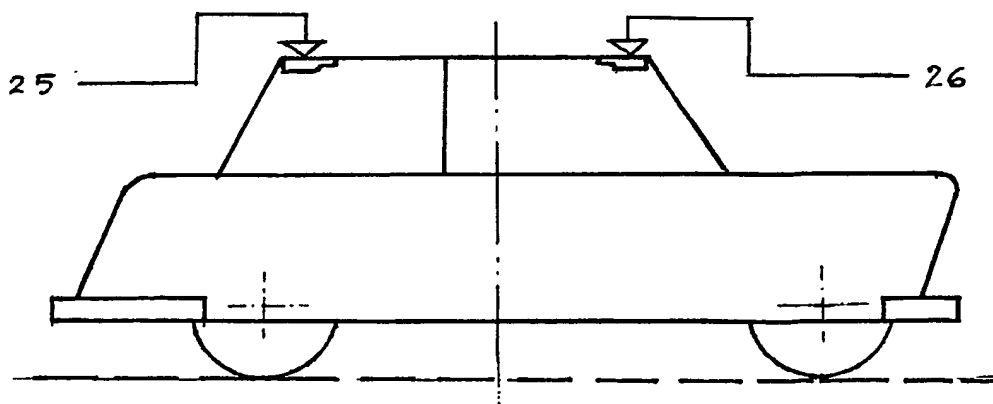
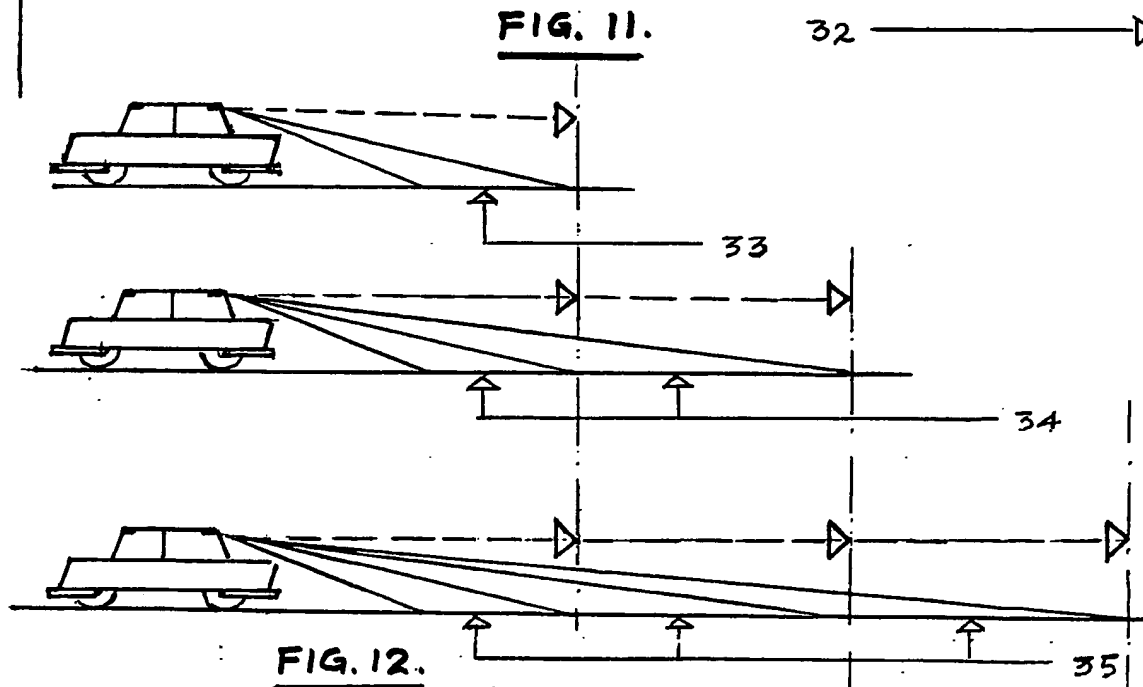
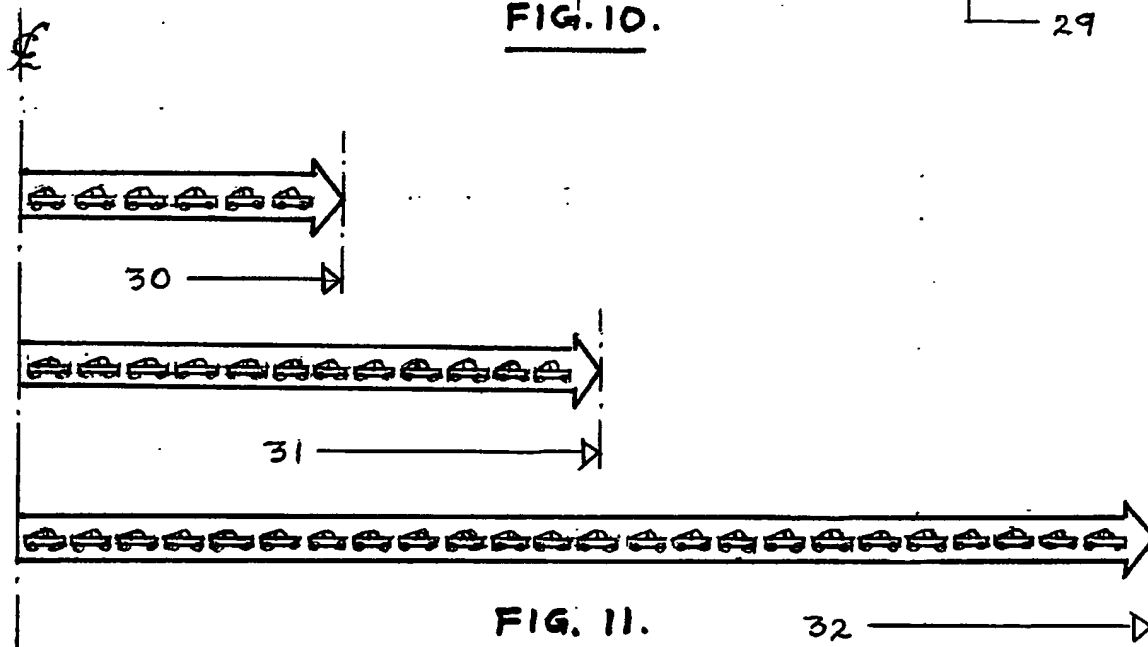
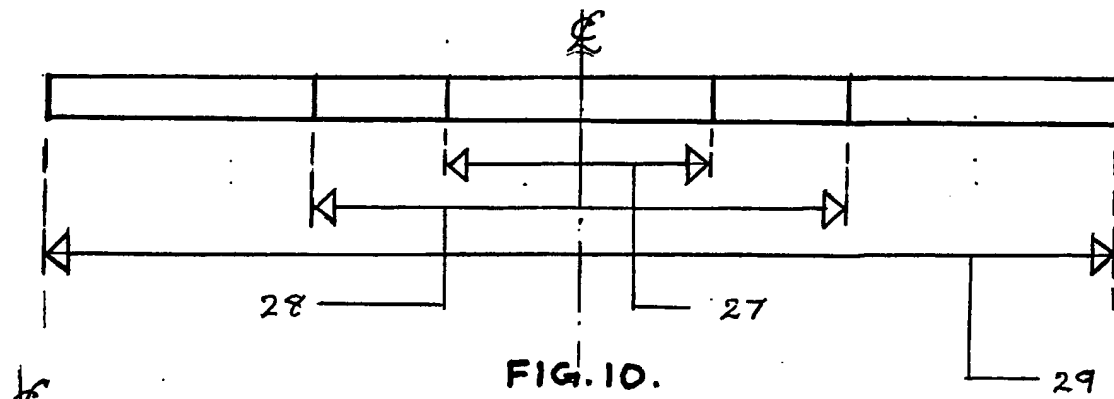
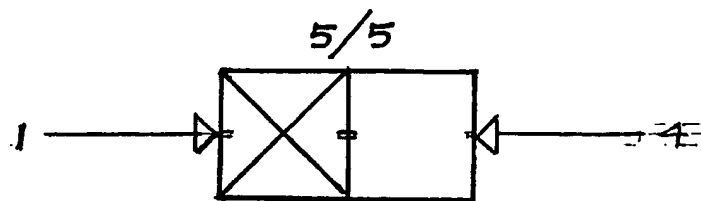


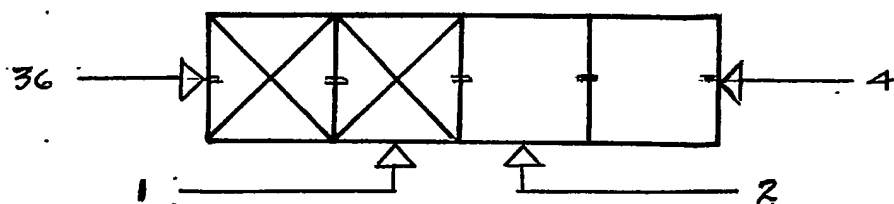
FIG. 9.

4/5

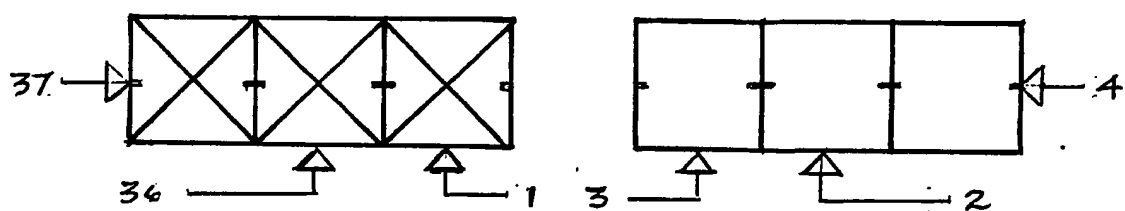




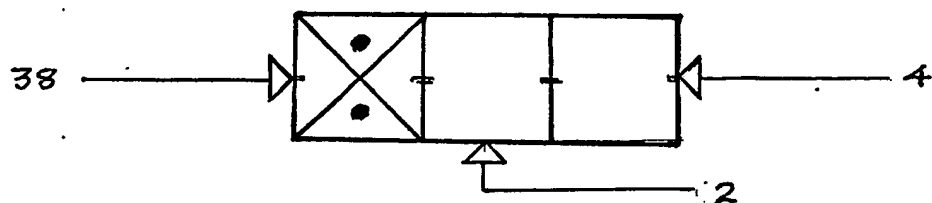
**FIG. 13.**



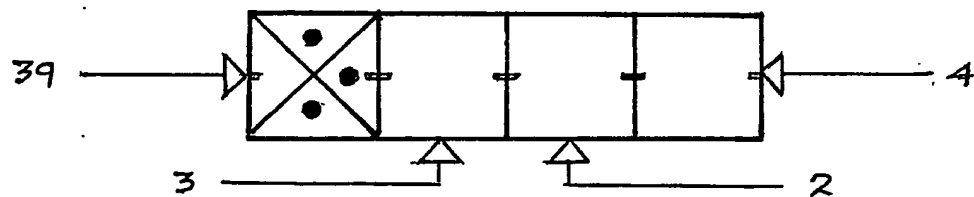
**FIG. 14.**



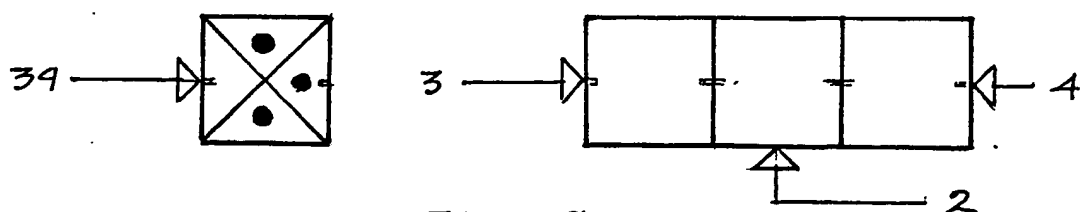
**FIG. 15.**



**FIG. 16.**



**FIG. 17.**



**FIG. 18.**

## DISTANCE ALARM DEVICE

### SPECIFICATION

This invention relates to a distance alarm device, which when fitted to a travelling vehicle may warn the driver, by means of visual, and/or, audible alarms, of the distance of other vehicles in the vicinity, from the said vehicle. It may, in addition, when fitted in the appropriate position, or positions, produce visual alarm signals to warn the drivers of other vehicles located in front, and at the rear, of their distance from the said vehicle. The device may be fitted inside, or outside, a vehicle which may require to travel by road, by rail, or for any other mode of transport. All of which may have to operate in various environments, and during inclement weather conditions.

Alarm, or warning devices, are generally fitted in vehicles to alert the driver that some particular part of the vehicle requires attention. These warnings usually refer to such items as low fuel, low engine oil, or low windscreen wash etc. When fitted, these warning devices usually only relate to the vehicle itself, and its operational efficiency. They do not normally appertain to the safety of the vehicle itself in relation to other vehicles in the vicinity, or the environment, or the conditions in which the vehicle may have to operate.

It is the object of this invention therefore, to provide the driver of a vehicle with a device, which when fitted to the said vehicle, may alert him/her, by various visual and audible signals, to any potential danger from other vehicles operating in the vicinity. It is intended that the device may be activated by sensors to produce these signals when, say, a vehicle in front is located within certain specified distances, or zones, of the said vehicle. The same, or similar device may be fitted, in addition, in another position, to produce signals relative to specific distances or zones, for, say, a vehicle located at the rear. Such signals, visible and audible, may then allow the driver, or drivers, sufficient time to take appropriate action to avoid any potential danger, or damage, to the said vehicles and their occupants.

The device may contain electrically operated sensors which would be capable of locating the distance of other vehicles, at the front, and rear, within specified zones. These distances may be related to the overall stopping distances, when a vehicle is travelling at a specific speed of MPH or KPH. However, it is contemplated that various countries may specify and adopt criteria on distances, or zones, and related matters best suited to each individual country, its environment, and conditions which may be encountered. The device may normally contain either one, two or three single sensors to suit individual requirements. It is anticipated that the three sensor devices may provide warning signals for a long distance 'CONTACT ZONE' (of say approx a 24 No vehicle distance); a middle distance 'WARNING ZONE' (of say approx a 12 No vehicle distance); and a short distance of 'DANGER ZONE' (of say approx 6 No vehicle distance). A two sensor device may provide warning signals for a middle distance warning zone, and a short distance danger zone. A one sensor device may provide warning signals for a short distance danger zone only. To increase choice, and adaptability, to suit all types of vehicles, a combined range sensor may be developed as a single unit to provide warning signals for short distance and middle distance zones, and another combined range sensor as a single unit to provide warning signals for short, middle and long distance zones.

Thus a choice of at least five or six models, or combinations, of the device could be developed and made available to suit universal requirements.

The sensors may preferably be transmitter only types, such as a passive infra-red sensor, which is a fixed beam of known, or fixed distance. these may locate the mass, movement and heat of a vehicle on a narrow beam at short, middle or long distances with the use of low voltage power. An ultrasonic measuring unit, normally used with LCD readouts, may also be considered for short, and possibly other distances, as this also operates on low voltage power. It is understood that passive infra-red, and ultrasonic sensors, as stated for the required distances, may already be available on the market, and capable of being adapted for this unique purpose. Transmitter/receiver systems may also be utilized for these sensors if they are considered to be economical, and effective. Such systems may, however, require some form of universal adoption to be effective, with transmitters and receivers fitted to all vehicles. Laser oscillators, radar, and doppler radar systems may all warrant consideration, technically and economically, for utilization with these interlocking type sensors and light units.

The warning lights may usually be contained within the device as an integral feature, but can be separate units if required. It is envisaged that these warning lights may be illuminated by activation of the sensors when a vehicle in front, or a vehicle at the rear comes within specified distances, or zones. These lights may be generated to produce standard illumination, or by flashing bulbs, or mechanisms, to accentuate each zone, particularly the danger zone, to the driver of the vehicle, and to drivers of other vehicles in the proximity. The lights may also be coloured to clearly identify the particular distances, or zones. Thus the long distance, or 'CONTACT ZONE' may be identified with the illumination or flashing of, say, a green light. The middle distance or 'WARNING ZONE' may be identified with the illumination or flashing of, say an amber light. The short distance of 'DANGER ZONE' may be identified with the illumination or flashing of, say, a red light. It is appreciated however, that a warning device that might contain three single sensors may require separate interlocking type light units.

An electrically operated buzzer, bell or bleeper may also be fitted to provide an effective audible supplementary warning to the driver immediately the vehicle enters a 'DANGER ZONE'. It is envisaged that this audible buzzer would be activated by the short distance sensor and may be contained within the warning device, or as a separate unit. A volume control may also be incorporated to compensate for drivers who may have hearing difficulties, or if external noise levels should increase excessively. Alternatively, a pre-recorded audio tape may be incorporated, and activated by the sensors to produce a verbal warning to the driver for each zone or distance.

Over-ride switches may also be contained within the device to allow each sensor to be switched on, or off, as may be required to suit any type of driving conditions. One can envisage that it may be appropriate to have all sensors switched on for say, motorway driving and possibly all sensors switched off for urban driving. The short distance sensor may however prove to be an essential requirement even in built-up areas, particularly for, say, night driving, or in fog, or during any type of inclement weather conditions. The over-ride switches therefore provide a completely flexible system by which any separate sensor, or light may be switched on, or off, to suit all driving conditions. It is however, contemplated that



possibly the greatest benefit to be derived from this distance alarm device may be for drivers of vehicles on motorways and super-highways.

Adjustable alignment screws, vertical and possibly horizontal, with locking mechanism, may be incorporated in the device to collimate the line of sight of the sensors, which may be combined into one unit, or utilized as separate units. The same, or similar, alignment facility may also be provided for the separate light units. It would also accommodate the adjustments which may be necessary for fixing the device, or sensors, to various types, and sizes, of vehicles to suit the sensor scan distances required.

The location of the device may be in any interior or exterior position on the vehicle which is considered to be most appropriate for scanning to identify the distance of other vehicles and to provide adequate visual and audible alarm signals to the driver. In this respect possible location positions for forward scanning which may be considered are inside at the top of the front windscreen, above where the arcs of the windscreen wipers intersect, between the sun visors or at the top of the windscreen on the passenger side. For rear scanning, if no windscreen wiper is fixed, the device may be fitted at the top centre of the rear windscreen. If a rear windscreen is fixed, the device may be fitted at the top right, or top left hand side of the rear windscreen. The device when fitted at the front or rear, behind the windscreens, would be securely fixed under the roof of the vehicle and located at high point for clear sighting. Its limited size may also ensure that the scanning sensors would be clear of the windscreen wipers, and would not impede the vision of the driver either to the front or to the rear.

In summary, the Distance Alarm Device (DAD) may produce the following visual and audible alarms for the driver of the vehicle, and for drivers of other vehicles to the front or rear of the said vehicle. When the long distance sensor alarm contacts a vehicle in front a green light illuminates, or flashes on the DAD in front of the driver. If an audio tape is incorporated, a pre-recorded verbal statement may say "Attention front - CONTACT ZONE entered". If the distance reduces, the green light remains on until the middle distance sensor beam contacts the other vehicle. the amber light then illuminates or flashes and the green light goes off. The audio tape, if used, may then state "Attention front - WARNING ZONE entered - slow down!" If the distance reduces again the amber light remains on until the short distance sensor contacts the other vehicle. The red light then illuminates and flashes and the amber light goes off. Immediately a buzzer, bleeper or bell will sound and, or, the audio tape may say "Attention front - DANGER ZONE entered - brake now!" The same, or similar action may be produced if a DAD is fitted inside the rear windscreen, with the audio tape's verbal statements appropriately revised to suit rear view scanning. In addition to the visual and audio warning signals for the driver of the said vehicle, the drivers of vehicles to the front and rear would also see the various illuminated or flashing coloured lights, thus giving three drivers sufficient warning to take the appropriate evasive action as may be required.

The overall concept of this invention, the Distance Alarm Device, (DAD) is simply to provide an effective facility for keeping all moving vehicles apart. It is also intended that such a device may be produced economically, adaptable and sufficiently simple to enable it, and/or, its component parts to be fitted to the majority of existing vehicles in addition to new models. This invention is unique because when the device is fitted to only one vehicle at the front and rear, it may alert up to three drivers of the proximity of their vehicles to each other. The resultant action of this device, or devices, may therefore provide a cumulative effect of

distance alarm signals to the majority of drivers on, say, motorways, when it is fitted to most vehicles to produce an overall traffic safety control. One may envisage in future that the fitting of such a device with at least one sensor, to alert all drivers of 'DANGER ZONES' may eventually become a compulsory requirement for all vehicles, particularly on motorways. It may therefore be likened to a system of mobile traffic lights, constantly alerting all drivers of the distances, and danger zones, to which they must respond.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:-

**Figure 1** shows in perspective, the distance alarm device, as seen by the driver of the vehicle, which contains a short distance 'danger zone' light, a middle distance 'warning zone' light and a combined sensor for short and middle distances.

**Figure 2** illustrates a longitudinal cross-section through a light unit.

**Figure 3** shows a horizontal cross-section through a light unit.

**Figure 4** displays in perspective, the distance alarm device, which contains only a short distance 'danger zone' light, and a short distance 'danger zone' sensor.

**Figure 5** shows the side elevation of the above unit with horizontal collimation line of sight.

**Figure 6** illustrates a side elevation of the same unit with an angled, or tilted collimation line of sight.

**Figure 7** displays a front view of the distance alarm device, with short and middle distance lights and combined sensor, at approximately full size.

**Figure 8** shows from the front of a vehicle one central position where the distance alarm device may be fitted.

**Figure 9** illustrates a side elevation of a vehicle showing the positions where the distance alarm device may be fitted at the front, and at the rear of the vehicle.

**Figure 10** displays the short, middle, and long zones at the front, and at the rear of a vehicle, either side the centre line, or position of the vehicle.

**Figure 11** shows the approximate number of vehicle units in a short distance 'danger zone', a middle distance 'warning zone', and a long distance 'contact zone' at the front of a vehicle, and may be repeated to the rear.

**Figure 12** illustrates the short, middle, and long distance sensor beams, from the front of a vehicle, which may be repeated to the rear.

**Figure 13** shows a front view of a distance alarm device with a short distance warning light, and short distance sensor.

**Figure 14** shows a device with short and middle distance warning lights, and <sup>short and</sup> middle distance sensors.

**Figure 15** shows separate device units, one with short, middle, and long distance single sensor units, the other with short, middle, and long distance warning light units.

**Figure 16** shows a distance alarm device with short and middle distance warning light units, and a combined sensor for the same distances.

**Figure 17** shows a distance alarm device with short, middle and long distance warning light units, and a combined sensor for all three distances.

**Figure 18** shows the same units as in figure 17 but with the combined sensor fixed in a separate position to provide flexibility in fixing.

Referring to fig 1: where the short distance light unit is 3, driver's reflecting lights are 4 and 7. Middle distance reflecting lights are 2 and 6 and 5 is the audible warning aperture. Manual over-ride switches are 8, vertical adjustment mechanism 9, alternate adjustment positions 10, combined sensor unit, for short and middle distance, 38, fixing block to roof 11, sun visor 12, and rear view mirror 13.

Referring to fig 2: fixing block is 11, vertical adjustment 9, driver's coloured reflecting lights 2 and 16, flashing bulb 14, audible warning buzzer, or tape, 15, front light cover 17, and hinged fixing 18.

Referring to fig 3: shows adjustment mechanism 9, driver's coloured reflecting light 2, rear flashing bulb 14, audible warning buzzer, or tape 15, light reflector 19, front flashing bulb 20, front light cover 17.

Referring to fig 4: the short distance sensor is 1, the short distance warning light 3, driver's reflecting light 4 and 7, audible warning aperture 5, vertical adjustment inserts, or fixing holes 10, adjustable fixing blocks 11, sun visor 12 and rear view mirror 13.

Referring to fig 5: adjustable fixing blocks 11, vertical adjustment inserts, or fixing hole 10, driver's reflecting light 4, hinged fixing 18 and horizontal collimation line 21.

Referring to fig 6: adjustable fixing blocks 11, vertical adjustment inserts, or fixing hole 10, driver's reflecting light 4, hinged fixing 18, angled, or tilted collimation 21.

Referring to fig 7: short distance warning light is 3, middle distance warning light is 2, interlocking inserts and/or elective connections 22, and short and middle distance combined sensor is 38.

Referring to fig 8: shows front central fixing position where a distance warning may be fitted is 24, windscreen wipers are indicated at 23.

Referring to fig 9; shows positions where the device may be fitted at the rear 25, and at the front 26.

Referring to fig 10; shows the short distance, or danger zone at 27, the middle distance, or warning zone at 28, and the long distance, or contact zone at 29.

Referring to fig 11; shows the front short distance danger zone, say six vehicles, at 30, the front middle distance warning zone, say twelve vehicles at 31, and the front long distance, contact zone, say twenty four vehicles at 32.

Referring to fig 12; shows the front short distance sensor beam at 33, the front short and middle distance sensor beams at 34, and the short, middle, and long distance sensor beams at 35.

Referring to fig 13; shows short distance sensor at 1, and the short distance warning light at 4.

Referring to fig 14; shows short distance sensor at 1, middle distance sensor at 36, short distance warning light at 4, and middle distance warning light at 2.

Referring to fig 15; shows sensors short distance 1, middle distance 36, long distance 37, and warning lights short distance at 4, middle distance at 2, and long distance at 3.

Referring to fig 16; shows warning lights short distance at 4, middle distance at 2 and combined short and middle distance sensor at 38.

Referring to fig 17; warning lights short distance 4, middle distance 2, and long distance at 3, combined short, middle and long distance sensor at 39.

Referring to fig 18; indicates the same notation as figure 17 but with sensor and light units separated.

## CLAIMS

- 1 A distance alarm device, or devices, which when fitted in the appropriate position, or positions, to a travelling vehicle, may alert the driver, by various visual and audible alarm signals, of the distance, and therefore any potential danger, from other vehicles which may be located in front, or at the rear, of the said vehicle.
- 2 A distance alarm device, or devices, as claimed in Claim 1 which may be fitted at the front, and also at the rear, of the said vehicle whereby visual alarm signals may be transmitted to the driver of the vehicle, and to the drivers of other vehicles located at the front, and at the rear, of the said vehicle, thus warning at least three drivers of the distance of their vehicles from each other.
- 3 A distance alarm device, or devices, as claimed in claim 1, or Claim 2, whereby the device may be fitted inside, or outside, a vehicle which may require to travel by road, by rail, or any other mode of transport. All of which may have to operate in various environments, and during any inclement weather conditions.
- 4 A distance alarm device, or devices, as claimed in Claim 1, or Claim 2, or claim 3, which may contain electrically operated sensors, which may be capable of locating the distance of other vehicles, located at the front, or rear of the said vehicle within predetermined zones, or distances. These sensors may be individual single units for separate specific distances, or a combined range single unit for scanning several predetermined distances. such sensors may also be effective in activating the visual, and audible alarm signals, suitable to the predetermined zones, or distances.
- 5 A distance alarm device, or devices, as claimed in Claim 4, whereby the sensors, visual and audible signals, are all compatible with the prearranged distances required. such distances may be related to the overall stopping distances when a vehicle is travelling at a specific speed of MPH or KPH. However it is contemplated that various countries may specify, and adopt criteria on distances, zones, and related matters best suited to their own requirements.
- 6 A distance alarm device, or devices, as claimed in any preceding claim, whereby the device may contain either one, two, or three sensors to suit individual requirements. A three sensor device may activate alarm signals for a long distance 'contact zone', a middle distance 'warning zone' and a short distance 'danger zone'. A two sensor device may activate alarm signals for a middle distance warning zone and a short distance danger zone. A one sensor device may activate alarm signals for a short distance danger zone only. A combined range sensor may also be incorporated, as a single unit, as an alternative for scanning, and warning signals, for short and middle distance zones, and another combined range, single unit sensor for short, middle and long distance zones.
- 7 A distance alarm device, or devices, as claimed in any preceding claim, whereby the sensors may be transmitter types only, such as passive-infra-red, or ultrasonic units. these may locate the mass, movement, and heat of a vehicle at short, middle, or long distances.

operating in narrow beams, and using low voltage electricity. Alternatively, such sensors may operate via transmitter/receiver systems, laser oscillators, radar, or doppler radar systems, dependent on effectiveness, reliability, and economic considerations.

8 A distance alarm device, or devices, as claimed in any preceding claim, whereby warning lights may be contained within the device, or may be located as separate units. these warning lights may be activated by the sensors to produce standard illumination, or operated by a flashing bulb, or mechanism, to identify and accentuate a zone, or danger zone, to the driver of the said vehicle, and the drivers of vehicles located at the front and rear. Such warning lights may also be in different colours in order to clearly recognize each of the different distance zones separately as specified under claims 4, 5 and 6.

9 A distance alarm device, or devices, as claimed in any preceding claim, whereby an electrically operated buzzer, bell, or bleeper may also be fitted to provide an effective supplementary warning to the driver immediately the vehicle enters a danger zone. It may be activated by the short distance sensor, and may be fitted with a volume control to compensate for drivers who may have hearing difficulties or if external noise levels increase excessively. In addition, or alternatively, a pre-recorded audio tape may be incorporated, and activated by the sensors, to give a verbal warning to the driver for each zone, or distance.

10 A distance alarm device, or devices, as claimed in any preceding claim, whereby each sensor may be provided with a manual over-ride switch to allow each sensor, or light, to be switched on or off to suit various driving conditions. By this means a completely flexible system may be provided to suit motorway, urban, night driving, and inclement weather conditions.

11 A distance alarm device, or devices, as claimed in any preceding claim, whereby the device itself, or each separate sensor, or light unit, may be provided with vertical, and possible horizontal, alignment screws, with locking mechanism, to adjust and collimate the line of sight of the sensors, and light units. this adjustment facility may also accommodate the requirements necessary for fitting the device, or sensors, to various types and sizes of vehicles to suit the sensor scan distances required.

12 A distance alarm device, or devices, as claimed in any preceding claim, which may be produced economically, and be sufficiently simple, and adaptable to enable it, or it's component parts to be fitted to the majority of existing vehicles, in addition to new models.

13 A distance alarm device, or devices, as claimed in any preceding claim, inwhich the device may be contained in a single unit and fixed in a specific position, or it's component parts may be separate, and located in various positions to suit the vehicle; the sensor scanning; the visual and audible alarms, and the requirements of the driver.

14 A distance alarm device, or devices, as claimed in any preceding claim, which may be produced in various models, or combinations with either one, two or three sigle range sensors, or combined range sensors, to scan several zones, or distances, thus providing a comprehensive range of distance alarm devices, to suit individual requirements for safety and cost considerations. Therefore a choice would be provided for the majority of drivers to have the opportunity to participate in reducing the present high rate of vehicle accidents.

15 A distance alarm device, or devices, as claimed in any preceding claim, which is unique because when fitted to only one vehicle, front and rear, it may alert up to three drivers of the proximity of thier vehicles to each other. The resultant action of this device, or devices, may therefore provide a cumulative effect of distance alarm signals to the majority of drivers on, say, motorways, when it is fitted to most vehicles to produce an overall vehicle safety control. It may therefore be likened to a system of mobile traffic lights, constantly alerting all drivers of the distances, and danger zones, to which they must respond.

**Relevant Technical Fields**

- (i) UK Cl (Ed.) H4D (DRPC, DLPA, DLRC, DLRE, DLAA, DLAB) G4Q (QCE)
- (ii) Int Cl (Ed.) G01S 13/93 G08G 1/16 B60Q 9/00, 1/52, 1/44

Search Examiner  
 DR E P PLUMMER

Date of completion of Search  
 12 DECEMBER 1994

**Databases (see below)**

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
 ALL

(ii)

**Categories of documents**

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.
- Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A: Document indicating technological background and/or state of the art. &: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X,Y	GB 2260209 A	(HARDY) whole document	X:1,3,4,5, 6,7,9,12, 13,14 Y:2
Y	EP 0493141 A1	(THOMSON-CSF) whole document	2
Y	EP 0446163 A1	(ALEJO TREVIJANO & JOSE JAVIER) whole document	2
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X,Y	US 3210726	(COPSY) whole document	X:1,3,4,6, 7,9,12,13, 14 Y:2
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